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Soil moisture monitoring in the coleambally irrigation area

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SOIL MOISTURE MONITORING IN THE COLEAMBALLY IRRIGATION AREA

Mike Ridley

Soil Moisture Monitoring (SMM) is one of twelve elements of the Coleambally Water Smart Australia (CWSA) project currently being implemented by Coleambally Irrigation Cooperative Ltd (CICL).

The CWSA project aims to implement smart irrigation technologies across the area in order to increase the efficiency of irrigated water use, improving irrigated crop productivity & generating water savings. The project is jointly funded by the Australian Government Water Fund & the Coleambally Irrigation Cooperative Limited (CICL). CWSA commenced in October 2007 & is scheduled to end in November 2011.

Prior to the CWSA project, the level of adoption of soil moisture technology has been very low in the Coleambally area. CICL estimates that less than 1% of irrigators in the Coleambally Irrigation District formerly used soil moisture probes (SMP) to monitor irrigation applications. One of the barriers to their use in the management of annual crops is that irrigators only get one chance to get the watering decision right; miss an irrigation event & the crop could be lost. Thus relying solely on soil moisture sensors has traditionally been considered too great a risk in the view of many CICL irrigators.

The initial requirement was to contract for the design, supply, installation & support of eight hundred SMPs for the purpose of improving irrigation scheduling on seasonal or broad-acre crops & assessing water balances in rice bays.

The lack of availability of suitable equipment, combined with the continuation of diminished water allocations with subsequent impacts on rice crops planted, meant that the assessment of water balances in rice bays has not been possible.

A process for recruiting new participants included publicising the program in the irrigator newsletters, targeted emailing & one to one communication with likely interested parties.

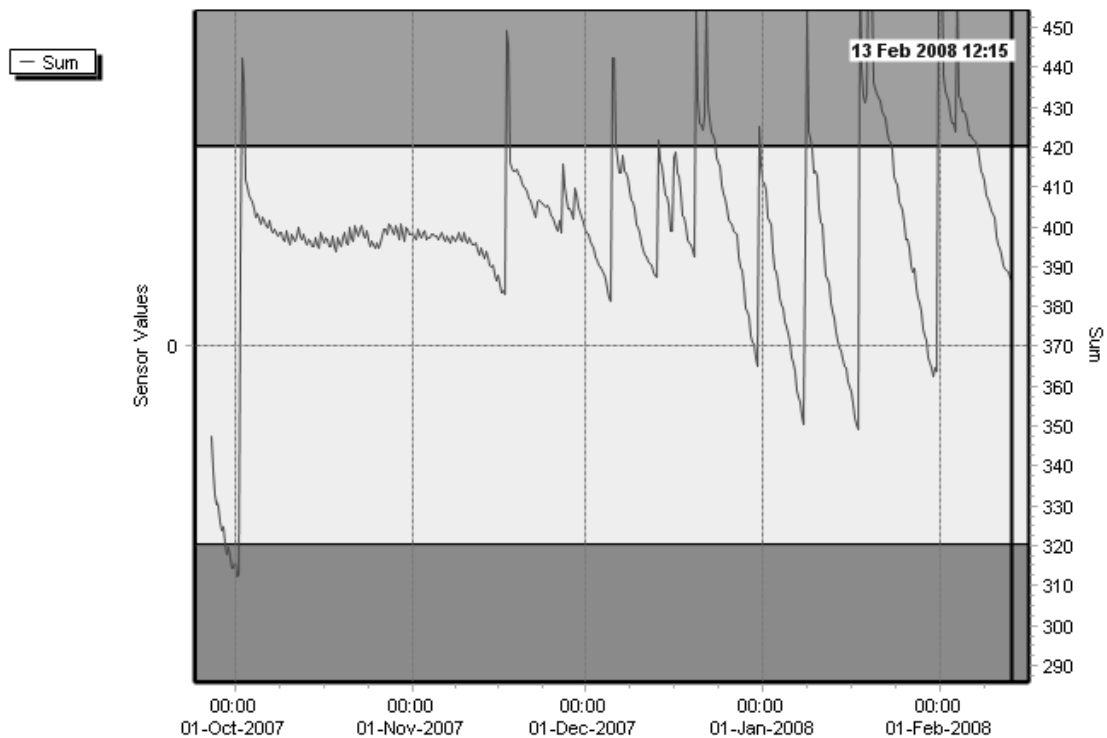
Interest from a wide range of farmers with differing farming operations, meant that this technology has not been limited to seasonal or broad-acre crops. SMM has been achieved in permanent & perennial plantings, in both winter & summer seasonal & broad-acre crops, located in horticulture, normal broad-acre & large-area Coleambally farms.

A small number of probes have been strategically located for water balance studies that are being conducted by Charles Sturt University.

Various SMPs from different established manufacturers have been trialled over the last 2 years. Their application, performance & ability to be integrated into the existing CICL system has been assessed with the result being a single type of probe is now being implemented, with the benefits of allowing components to be easily interchanged, more easily tracked & more streamlined administration of the program.

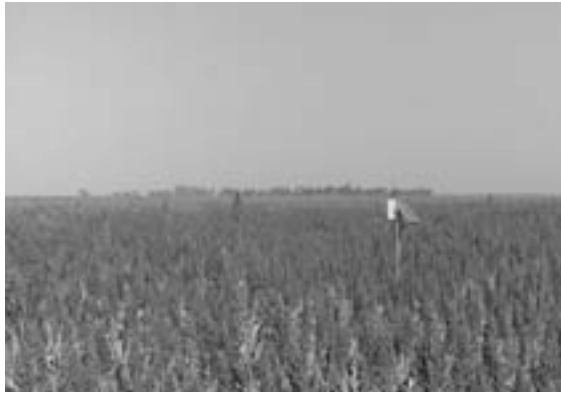
Two different telemetry systems have been utilised. The first has involved a standard probe radio to relay data through an irrigator's existing automated on-farm water metering device, with data upload through the existing (SCADA) radio network to the CICL base. Data is available over the irrigator's portal in the CICL water management system, via an irrigator's external web connection.

This winter season, a second system is being trialled which allows SMM for irrigators located in the extremities of the area & for those without a specific automated on-farm water metering device. In this system, a Next-G data transmitter replaces the standard probe radio & transmits data from it & adjacent probes directly to an off-site server. Irrigators can access data in a similar way using appropriate user login procedures to a specific web address.



Sample of Soil moisture graph (summed-sensors) for a Corn Crop, indicating over-watering events

The provision of agronomic services to train irrigators in using the soil moisture probes for irrigation scheduling, has been conducted since the program's inception. This has been delivered via both individual one-on-one sessions at the irrigator's home or office & via two-part group sessions at a central location. SMP technology & data interpretation were the main topics of discussion.



SMP installation in a sorghum crop



SMP scheduling – group training session

SMPs have been steadily acquired since summer 2007/08, with nearly the entire total of seventy currently in active service. They have been deployed in over one hundred & twenty installations on both irrigators' farms & the Coleambally Community Experimental Demonstration Farm.

The criteria for the receipt of SMPs comprised: irrigators that had sufficient irrigation allocation to grow viable crops, those who were interested in soil moisture monitoring technology as a potential irrigation scheduling tool & those with an internet connection of reasonable reliability/speed.

Grower feedback has been an important part of improving the delivery of this program & to the overall service to irrigators. Feedback generally has been positive, but has highlighted that real-time (immediate) in-field data is essential in getting the most out of SMP technology & in building trust in their utilization for water scheduling.

Lessons learned include the importance of continued irrigator support via agronomic advice & system checks by CICL; that irrigator trust & adoption may take longer than anticipated; that component reliability & overall system integrity is a major factor in continued irrigator adoption.

SMM under this program has thus far been implemented free-of-charge to irrigators. This is currently under review with a small fee likely to be incurred by participating irrigators in order to cover non-capital costs, such as installation, maintenance & decommission. At this time, participating irrigators may be required to sign an agreement for such aspects as the term of use, care of the equipment & mandatory reporting on cropping & water use outcomes.

The higher than anticipated cost of the program, continued drought, likely continuation of reduced allocations & subsequent reduction in crops grown, has meant that it is unlikely that any additional probes will be attained at this time. In the case of irrigators' interest exceeding available SMP stock, a competitive assessment of applications will be undertaken by CICL to prioritise resources accordingly.